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PCT/EP2003/009074



## PATENT COOPERATION TREATY

## PCT

## INTERNATIONAL PRELIMINARY EXAMINATION REPORT

(PCT Article 36 and Rule 70)

Applicant's or agent's file reference 2002/G009	<b>FOR FURTHER ACTION</b> See Notification of Transmittal of International Preliminary Examination Report (Form PCT/IPEA/416)	
International application No. PCT/EP2003/009074	International filing date ( <i>day/month/year</i> ) 16 August 2003 (16.08.2003)	Priority date ( <i>day/month/year</i> ) 19 August 2002 (19.08.2002)
International Patent Classification (IPC) or national classification and IPC C08L 59/00		
Applicant TICONA GMBH		

1. This international preliminary examination report has been prepared by this International Preliminary Examining Authority and is transmitted to the applicant according to Article 36.

2. This REPORT consists of a total of 7 sheets, including this cover sheet.

This report is also accompanied by ANNEXES, i.e., sheets of the description, claims and/or drawings which have been amended and are the basis for this report and/or sheets containing rectifications made before this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions under the PCT).

These annexes consist of a total of 7 sheets.

3. This report contains indications relating to the following items:

- I  Basis of the report
- II  Priority
- III  Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
- IV  Lack of unity of invention
- V  Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
- VI  Certain documents cited
- VII  Certain defects in the international application
- VIII  Certain observations on the international application

Date of submission of the demand 17 February 2004 (17.02.2004)	Date of completion of this report 18 January 2005 (18.01.2005)
Name and mailing address of the IPEA/EP	Authorized officer
Facsimile No.	Telephone No.

## INTERNATIONAL PRELIMINARY EXAMINATION REPORT

International application No.

PCT/EP2003/009074

## I. Basis of the report

## 1. With regard to the elements of the international application:\*

 the international application as originally filed the description:

pages \_\_\_\_\_ 1-23 \_\_\_\_\_, as originally filed

pages \_\_\_\_\_, filed with the demand

pages \_\_\_\_\_, filed with the letter of \_\_\_\_\_

 the claims:

pages \_\_\_\_\_, as originally filed

pages \_\_\_\_\_, as amended (together with any statement under Article 19

pages \_\_\_\_\_, filed with the demand

pages 1-10 \_\_\_\_\_, filed with the letter of 22 December 2004 (22.12.2004)

 the drawings:

pages \_\_\_\_\_, as originally filed

pages \_\_\_\_\_, filed with the demand

pages \_\_\_\_\_, filed with the letter of \_\_\_\_\_

 the sequence listing part of the description:

pages \_\_\_\_\_, as originally filed

pages \_\_\_\_\_, filed with the demand

pages \_\_\_\_\_, filed with the letter of \_\_\_\_\_

## 2. With regard to the language, all the elements marked above were available or furnished to this Authority in the language in which the international application was filed, unless otherwise indicated under this item. These elements were available or furnished to this Authority in the following language \_\_\_\_\_ which is:

 the language of a translation furnished for the purposes of international search (under Rule 23.1(b)). the language of publication of the international application (under Rule 48.3(b)). the language of the translation furnished for the purposes of international preliminary examination (under Rule 55.2 and/or 55.3).

## 3. With regard to any nucleotide and/or amino acid sequence disclosed in the international application, the international preliminary examination was carried out on the basis of the sequence listing:

 contained in the international application in written form. filed together with the international application in computer readable form. furnished subsequently to this Authority in written form. furnished subsequently to this Authority in computer readable form. The statement that the subsequently furnished written sequence listing does not go beyond the disclosure in the international application as filed has been furnished. The statement that the information recorded in computer readable form is identical to the written sequence listing has been furnished.4.  The amendments have resulted in the cancellation of: the description, pages \_\_\_\_\_ the claims, Nos. \_\_\_\_\_ the drawings, sheets/fig \_\_\_\_\_5.  This report has been established as if (some of) the amendments had not been made, since they have been considered to go beyond the disclosure as filed, as indicated in the Supplemental Box (Rule 70.2(c)).\*\*

\* Replacement sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to this report since they do not contain amendments (Rule 70.16 and 70.17).

\*\* Any replacement sheet containing such amendments must be referred to under item 1 and annexed to this report.

## INTERNATIONAL PRELIMINARY EXAMINATION REPORT

International application No.  
PCT/EP 03/09074

## V. Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

## 1. Statement

Novelty (N)	Claims	1 - 10	YES
	Claims		NO
Inventive step (IS)	Claims	1 - 10	YES
	Claims		NO
Industrial applicability (IA)	Claims	1 - 10	YES
	Claims		NO

## 2. Citations and explanations

Reference is made to the following documents:

- D1: EP-A-0 156 285 (HOECHST AG) 2 October 1985 (1985-10-02), mentioned in the application
- D2: EP-A-0 565 304 (MITSUBISHI GAS CHEMICAL CO) 13 October 1993 (1993-10-13)
- D3: US 2001/049415 A1 (TAK-KYU KIM ET AL) 6 December 2001 (2001-12-06)
- D4: US-A-3 642 940 (BURG KARLHEINZ ET AL) 15 February 1972 (1972-02-15)
- D5: "Lotader AX 8840":  
<http://www.products.arkemagroup.com/literature/pdf/546.pdf>

1. The present application relates to polyoxymethylene molding materials (claims 1-8), their use (claim 9) and molded bodies (claim 10).

The newly submitted claims 1-10 satisfy the requirements of PCT Article 34(2) (b) .

2. Reference is made to the fact that the claimed materials can contain up to 40 percent by weight of other additives (cf. page 19, line 8 to page 21, line 13 and examples).

Reference is also made to the fact that formula III can be equal to formula II (e.g. formula III:  $x = 1$  and formula II:  $a = 1$  and  $b = c = 0$ ,  $X = \text{CH}_3$ ), and therefore the compatibilizer is formed from two base units and not from three base units (cf. claim 1, final paragraph, and example 4).

3. In the event that the compatibilizer is formed from two base units, in which case formula II equals formula III, claim 1 requires that the compatibilizer must contain at least 10.5 percent by weight of said base units. In example 4, Lotader AX 8840 is used (see description, page 22, line 23), which, according to document D5, contains only 8 percent by weight glycidyl methacrylate.

Example 4 should therefore either be deleted or identified as a comparative test (PCT Article 6).

4. Document D1 discloses impact-modified polyoxymethylene molding materials and molded components produced therefrom (claims 1-19; page 1, lines 1-14; page 2, lines 28-38). The molding materials contain 10 to 95 percent by weight (based on sums B and C) of an impact modifier (component C; page 8, line 13 to page 9, line 20) and 5 to 50 percent by weight of a rubber-elastic graft copolymer that functions as a compatibilizer (component B; page 9, lines 6-7). Example 9 is the only example of a mixture of components A, B and C. The mixture in example 9 has greater notch impact strength at 23°C and -20°C and greater damage energy at 23°C and -40°C. Example 9 can be combined with the threshold value of 5 percent by weight of component B according to claim 1 without it being necessary to select further elements. However, document D1 does not

disclose a compatibilizer consisting of base units I, III and III (and IV and/or V, where applicable).

5. Document D2 discloses impact-modified polyoxymethylene molding materials and molded components produced therefrom (claims 1-11; page 1, lines 3-24 and 37-54; page 5, lines 35-36 and 48-53; examples 1-14 and 16-17). The mixtures containing the reaction product of C and D have a greater impact strength than the mixtures that do not contain the reaction product (comparative tests 1-4). Document D2 does not disclose a compatibilizer consisting of base units I, III and III (and IV and/or V, where applicable).
6. Document D3 discloses impact-modified polyoxymethylene molding materials and molded components produced therefrom (claims 1-12; paragraphs [0002], [0013], [0022] and [0045] to [0050]; tables 1-3). The compatibilizer is a rubber grafted with maleic acid anhydride. Document D3 does not disclose a compatibilizer consisting of base units I, III and III (and IV and/or V, where applicable).
7. Document D4 discloses impact-modified polyoxymethylene molding materials and molded components produced therefrom (claims 1-4; page 1, first paragraph; page 8, first paragraph to page 10, third paragraph). Claim 1 shows a mixture of (A) 99 to 50 percent by weight of polyoxymethylene and (B) 1 to 50 percent by weight of a mixture of (B) (a) 5 to 30 percent by weight of a copolymer consisting of 99 to 70 percent by weight of acrylic acid ester and 1 to 30 percent by weight of butadiene and (B) (b) 95-70 percent by weight of a styrene polymer.

This means that claim 1 includes a copolymer consisting of 70 percent by weight of acrylic acid ester and 30 percent by weight of butadiene (B) (a), and additionally a mixture with 0.5 to 2.5 percent by weight of (B) (a) [if (B) (b) equals 95 percent by weight].

Since multiple choices are required in order to arrive at the subject matter of the present application, this subject matter is not anticipated in a manner prejudicial to novelty.

8. Therefore, the subject matter of claims 1-10 is considered novel (PCT Article 33(2)).
9. It appears that the subject matter of claims 1, 9 and 10 involves an inventive step (PCT Article 33(3)).

Document D4, which is considered the closest prior art, discloses impact-modified polyoxymethylene molding materials and molded components produced therefrom from which the subject matter of claim 1 differs in that the molding material contains 0.1 to 5.0 percent by weight of a compatibilizer formed from base units I, II and III (and IV and/or V, where applicable).

The problem to be solved by the present invention can thus be seen as that of providing polyoxymethylene molding materials with greater impact strength (see description, page 2, lines 9-11).

The solution to this problem as proposed in claim 1 of the present application involves an inventive step (PCT Article 33(3)) for the following reasons:

Document D4 states that mixtures of 5 to 30 percent by weight of (B) (a) and 95 to 70 percent by weight of (B) (b) in amounts of 1 to 50 percent by weight increase the impact strength of polyoxymethylene molding materials. In the examples, 10 and 20 percent by weight of ABS is added. ABS does not contain any co- or terpolymers formed from base units I, II and III (and IV and/or V, where applicable).

Document D4 does not state that components (B) (a) or (B) (b) are individually responsible for the increase in impact strength, rather only that the combination of (B) (a) and (B) (b) results in such an increase.

Examples 2 and 3 of the present application show that impact strength is increased by the addition of 0.5 or 1.0 percent by weight of an E-GMA-Ma terpolymer. This effect cannot be derived from document D4 or from document D1, D2 or D3.

10. Claims 2-8 are dependent upon claim 1 and thus likewise satisfy the PCT requirements with respect to novelty and inventive step.